

1 Claims

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3 1. A method of killing nematodes, said method
4 comprising the step of applying an effective
5 amount of a nematicidal composition comprising a
6 terpene component.

7

8 2. The method according to claim 1 wherein the
9 nematicidal composition comprises a terpene
10 component and water.

11

12 3. The method according to any preceding claim
13 wherein the terpene component is in solution in
14 water.

15

16 4. The method according to claim 2 wherein the
17 nematicidal composition comprises a surfactant
18 which holds the terpene in suspension in the
19 water.

20

21 5. The method according to claim 4 wherein the
22 surfactant is selected from the group consisting
23 of sodium lauryl sulphate, polysorbate 20,
24 polysorbate 80, polysorbate 40, polysorbate 60,
25 polyglyceryl ester, polyglyceryl monooleate,
26 decaglyceryl monocaprylate, propylene glycol
27 dicaprylate, triglycerol monostearate, TWEEN,
28 Tween 80, SPAN 20, SPAN 40, SPAN 60, SPAN 80,
29 Brig 30 and mixtures thereof.

30

31 6. The method according to claim 5 wherein the
32 surfactant is sodium lauryl sulphate.

- 1 7. The method according to any preceding claim
2 wherein the terpene component comprises one or
3 more terpenes selected from the group consisting
4 of citral, pinene, nerol, b-ionone, geraniol,
5 carvacrol, eugenol, carvone, terpeniol,
6 anethole, camphor, menthol, limonene, nerolidol,
7 farnesol, phytol, carotene (vitamin A,),
8 squalene, thymol, tocotrienol, perillyl alcohol,
9 borneol, myrcene, simene, carene, terpenene and
10 linalool.
- 11
- 12 8. The method according to any preceding claim
13 wherein the nematocidal composition comprises
14 citral as a terpene component.
- 15
- 16 9. The method according to any preceding claim
17 wherein the nematocidal composition has a pH of
18 less than 7.
- 19
- 20 10. The method according to any preceding claim
21 wherein the nematocidal composition has a pH
22 from around pH 3 to less than 7.
- 23
- 24 11. The method according to any preceding claim
25 wherein the nematocidal composition has a pH
26 from around pH 3 to around 5.
- 27
- 28 12. The method according to any preceding claim
29 wherein the nematocidal composition comprises
30 the terpene component at a concentration of from
31 about 125 ppm to about 2000 ppm in water.
- 32

- 1 13. The method according to any preceding claim
2 wherein the nematicidal composition comprises
3 the terpene component at a concentration of from
4 about 250 ppm to about 1000 ppm in water.
5
- 6 14. The method according to any preceding claim
7 wherein the nematicidal composition comprises
8 the terpene component at a concentration of from
9 about 500 ppm to about 1000 ppm in water.
10
- 11 15. The method according to any one of claims 1 to
12 14 wherein the nematicidal composition comprises
13 the terpene component at a concentration that
14 selectively kills root-knot nematodes over
15 saprophagous nematodes.
16
- 17 16. The method according to claim 15 wherein the
18 terpene component is at a concentration of about
19 250 ppm.
20
- 21 17. The method according to any preceding claim
22 wherein nematicidal composition comprises an
23 excipient.
24
- 25 18. The method according to claim 17 wherein
26 the excipient is a liposome.
27
- 28 19. The method according to claim 17 wherein the
29 excipient is hollow glucan particles which
30 encapsulate the terpene component.
31

- 1 20. The method according to claim 19 wherein, the
2 hollow glucan particles are yeast cell walls or
3 hollow glucan particles.
4
- 5 21. The method according to claim 20 wherein the
6 yeast walls are derived from Baker's yeast
7 cells.
8
- 9 22. The method according to claim 20 wherein the
10 hollow glucan particles are obtained from the
11 insoluble waste stream of a yeast extract
12 manufacturing process.
13
- 14 23. The method according to claim 20 wherein the
15 glucan particles are alkali extracted.
16
- 17 24. The method according to claim 20 wherein the
18 glucan particles are acid extracted.
19
- 20 25. The method according to claim 20 wherein the
21 glucan particles are organic solvent extracted.
22
- 23 26. The method according to any one of claims 19 to
24 25 wherein the hollow glucan particles have a
25 lipid content greater than 5% w/w.
26
- 27 27. The method according to claim 26 wherein the
28 hollow glucan particles have a lipid content
29 greater than 10% w/w.
30

1 28. The method according to any one of claims 19 to
2 27 wherein the terpene component is associated
3 with a surfactant.
4

5 29. The method according to claim 28 wherein the
6 surfactant is selected from the group consisting
7 of sodium lauryl sulphate, polysorbate 20,
8 polysorbate 80, polysorbate 40, polysorbate 60,
9 polyglyceryl ester, polyglyceryl monooleate,
10 decaglyceryl monocaprylate, propylene glycol
11 dicaprilate, triglycerol monostearate, Tween®,
12 Tween 80, Span® 20, Span® 40, Span® 60, Span®
13 80, Brig 30 and mixtures thereof.
14

15 30. The method according to claim any one of claims
16 19 to 29 wherein the hollow glucan particles
17 encapsulating the terpene component comprise 1
18 to 99% by volume terpene component, 0 to 99% by
19 volume surfactant and 1 to about 99% hollow
20 glucan particles.
21

22 31. The method according to any one of claims 19 to
23 30 wherein the hollow glucan particles
24 encapsulating the terpene component comprises
25 about 10% to about 67% w/w terpene component,
26 about 0.1 to 10% surfactant and about 40 to
27 about 90% hollow glucan particles.
28

29 32. The method according to any one of claims 19 to
30 31 wherein the nematocidal composition comprises
31 from about 500 to about 10,000 ppm hollow glucan

1 particles, the particles encapsulating from
2 about 1 to about 67% terpene component.

3

4 33. The method according to any one of claims 19 to
5 32 wherein the nematicidal composition comprises
6 from about 1000 to about 2000 ppm hollow glucan
7 particles, the particles encapsulating from
8 about 10 to about 50% terpene component.

9

10 34. The method according to claim 33 wherein the
11 nematicidal composition comprises from about
12 1000 to about 2000 ppm hollow glucan particles,
13 the particles encapsulating from about 10 to
14 about 30% terpene component.

15

16 35. The method according to any one of claims 19 to
17 34 wherein the terpene component comprises, 100%
18 citral, 50% citral and 50% b-ionone, 50% citral
19 and 50% a-terpineol, 50% d-limonene and 50% b-
20 ionone, or 50% a-terpineol and 50% b-ionone.

21

22 36. The method according to any preceding claim
23 wherein the nematicidal composition is applied
24 to at least a portion of, preferably all of, a
25 volume soil to be infested with nematodes.

26

27 37. The method according to claim 36 wherein the
28 application of the nematicidal composition is
29 repeated.

30

31 38. The method according to either claim 36 or 37
32 wherein the nematicidal composition is applied

1 to soil is carried out by spraying or
2 irrigation.

3

4 39. A method of preparing a nematicidal composition
5 comprising hollow glucan particles encapsulating
6 a terpene component, said method comprising the
7 steps of;

8 a) providing a terpene component;

9 b) providing hollow glucan particles;

10 c) incubating the terpene component with
11 the glucan particles under suitable
12 conditions for terpene encapsulation;
13 and

14 d) recovering the glucan particles
15 encapsulating the terpene component.

16

17 40. The method according to claim 39 further
18 comprising the step of drying the glucan
19 particles encapsulating the terpene component.

20

21 41. The method according to claim 40 wherein the
22 drying is achieved by freeze drying, fluidised
23 bed drying, drum drying or spray drying.

24

25 42. The method according to any one of claims 39 to
26 41 wherein in step a) the terpene component is
27 provided as a suspension in an aqueous solvent.

28

29 43. The method according to claim any one of claims
30 39 to 42 wherein the solvent is water.

31

- 1 44. The method according to any one of claims 39 to
2 43 wherein the terpene component is provided in
3 association with a surfactant.
4
- 5 45. The method according to claim 44 wherein the
6 surfactant is sodium lauryl sulphate,
7 polysorbate 20, polysorbate 80, polysorbate 40,
8 polysorbate 60, polyglyceryl ester, polyglyceryl
9 monooleate, decaglyceryl monocaprylate,
10 propylene glycol dicaprilate, triglycerol
11 monostearate, Tween®, Tween 80, Span® 20, Span®
12 40, Span® 60, Span® 80, Brig 30 or mixtures
13 thereof.
14
- 15 46. The method according to claim 45 wherein the
16 surfactant is sodium lauryl sulphate.
17
- 18 47. The method according to any one of claims 44 to
19 46 wherein the surfactant is present at a
20 concentration of about 0.1 to 10 % by volume of
21 the total reaction mixture.
22
- 23 48. The method according to claim 47 wherein the
24 surfactant is present at a concentration of
25 about 1%.
26
- 27 49. The method according to any one of claims 39 to
28 43 wherein the terpene component is provided as
29 a true solution in water.
30
- 31 50. The method according to any one of claims 39 to
32 49 wherein in step b), the hollow glucan

1 particles are provided as a suspension in a
2 solvent.

3

4 51. The method according to claim 50 wherein the
5 suspension comprises approximately 1 to 1000 mg
6 glucan particles per ml

7

8 52. The method according to claim 51 wherein the
9 suspension comprises approximately 200 to 400 mg
10 glucan particles per ml.

11

12 53. The method according to claim 39 to 49 wherein
13 the hollow glucan particles are provided as a
14 dry powder and added to the terpene-surfactant
15 suspension.

16

17 54. The method according to any one of claims 39 to
18 49 wherein the glucan particles are provided in
19 between the hydrodynamic volume and 1.5 times
20 the hydrodynamic volume of water.

21

22 55. The method according to any one of claims 40 to
23 54 wherein the conditions of step c) are
24 atmospheric pressure and a temperature of 20 to
25 37°C.

26

27 56. Use of a nematocidal composition comprising a
28 terpene component for the extermination of
29 nematodes.

30

- 1 57. The use according to claim 56 for the
2 extermination of nematodes in soil and/or
3 nematodes infecting plants.
4
- 5 58. The method according to any preceding claim
6 wherein all compounds present in the nematocidal
7 composition are classified as generally regarded
8 as safe.